WHAT IS CLAIMED IS:

1. A matched reactance machine power generation system to provide a substantially constant-voltage power at variable prime mover speeds for an electric distribution system, the matched reactance machine comprising:

a permanent magnet rotor type machine having a selected BEMF value, wherein said BEMF value is selected having a line-to-line peak voltage that is equal to a desired terminal voltage of said machine at a first machine speed; and

said permanent magnet rotor type machine further having a selected machine inductance value, wherein said machine inductance value is selected based upon a machine reactance value and a frequency value which correspond to a proportional increase in said selected BEMF value between said first machine speed and a second machine speed.

2. A matched reactance machine power generation system as claimed in claim 1, wherein said BEMF value is selected at said first speed where said BEMF value and said terminal voltage have a substantially equal amplitude and an electrical phase difference of approximately zero.

3. A matched reactance machine power generation system as claimed in claim 1, wherein said first machine speed corresponds to a substantially zero delivered power.

4. A matched reactance machine power generation system as claimed in claim 1, wherein said second machine speed corresponds to a substantially maximum delivered power.

5. A matched reactance machine power generation system as claimed in claim 1, wherein said machine reactance value is selected at said second speed from a vector diagram calculation for reactance including a machine terminal voltage vector and an internal machine voltage drop vector.

6. A matched reactance machine power generation system as claimed in claim 5, wherein said machine terminal voltage vector and said internal machine voltage drop vector are perpendicular.

7. A matched reactance machine power generation system as claimed in claim 1, wherein said machine speed is controlled to provide a substantially constant terminal voltage for a variable demand level.

8. A matched reactance machine power generation system as claimed in claim 1, wherein said excitation of said machine is fixed and achieved by at least one permanent magnet embedded in a rotor assembly.

9. A synchronous permanent magnet rotor machine to provide a substantially constant-voltage DC power for an electric power distribution system, the machine comprising:

a selected BEMF value, wherein said BEMF value is selected having a line-to-line peak voltage equal to a desired terminal voltage of said machine at a first machine speed; and

a selected machine inductance value, wherein said machine inductance value is selected based upon a machine reactance value and a frequency value which correspond to a proportional increase in said selected BEMF value between said first machine speed and a second machine speed.

10. A method for providing substantially constant-voltage power for an electric distribution system using a matched reactance machine power generation system, the method comprising the steps of:

providing a permanent magnet rotor type machine having a selected BEMF value and a selected machine inductance value, wherein an excitation of said machine is fixed and achieved by at least one permanent magnet embedded in a rotor assembly of said machine;

selecting said BEMF value for said machine, wherein said BEMF value is selected having a line-to-line peak voltage that is equal to a desired terminal voltage of said machine at a first machine speed;

selecting said machine inductance value for said machine, wherein said machine inductance value is selected based upon a machine reactance value and a frequency value which correspond to a proportional increase in said selected BEMF value between said first machine speed and a second machine speed; and

controlling said machine speed to provide a substantially constant terminal voltage for a variable demand level.

11. A method for providing substantially constant-voltage power for an electric distribution system using a matched reactance machine power generation system as claimed in claim 10, further comprising the step of:

selecting said BEMF value at said first speed wherein said BEMF value and said terminal voltage have a substantially equal amplitude and an electrical phase difference of approximately zero.

12. A method for providing substantially constant-voltage power for an electric distribution system using a matched reactance machine power generation system as claimed in claim 10, further comprising the step of:

selecting said machine reactance value at said second speed from a vector diagram calculation for reactance including a machine terminal voltage vector and an internal machine voltage drop vector.